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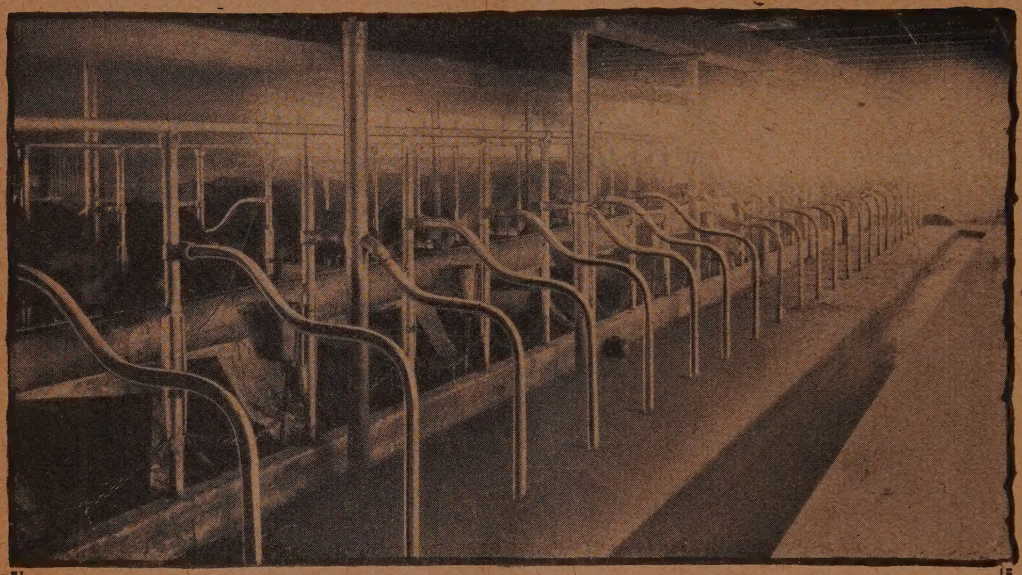

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The Relation of Science to the Potato Industry.*

WILLIAM STUART

United States Department of Agriculture, Washington, D.C.

In celebration of the seventy-fifth anniversary of the organization of the American Association for the Advancement of Science, its officers have requested each affiliated and associated organization to recognize this event by the presentation of a paper setting forth the relation of science to the development of the particular subject, industry, crop or crops that each of the organizations represents. It is not the purpose of this paper actually to cover every step of the development of the potato industry during the past 75 years. Doubtless such a course would offer less difficulty to the writer than that of attempting to sift out and discuss what appear to be the more important steps in this development. For convenience of treatment we may roughly divide the time into three periods—1848 to 1875; 1876 to 1900; 1900 to 1923, thus permitting of a discussion of the more salient phases of progress made during each period.

FIRST PERIOD

The beginning of the first period—1848 to 1875—marked the turning point of a series of disastrous late blight epidemics which very largely destroyed the potato crop in Europe, Great Britain and America during the years 1843 to 1847. Owing to a lack of scientific knowledge of plant diseases, at that time the grower had no means of combating infectious parasitic diseases. The compound miscroscope was then unknown and in consequence neither the scientist nor the grower had any very definite knowledge as to the nature of diseases, their method of attack, and remedies or control measures to employ in combating them. It was during this period that the Rev. Chauncey E. Goodrich of Utica, N.Y., conceived the idea that the susceptibility of the potato to disease was largely the result of reduction in vigor of the plants due to long continued asexual propagation. In support of this theory he advocated a return to the propagation of the potato from true seeds, or in other words to resort to seminal rather than asexual reproduction. At this time (1848) practically all varieties offered by American seedsmen consisted of "Old World" varieties. This is all the more interesting in view of the fact that the potato originally came from South America. It is not surprising, therefore, that Goodrich should have turned to South America as offering the most hopeful outlook for the improvement of the potato.

Development of American Varieties

According to Goodrich's own statements he began growing seedling potatoes in 1849. In 1851 through the kindness of the American consul at Panama, Goodrich received a small quantity of potatoes from South America and among this lot was one which he named the Rough Purple Chili. From naturally fertilized seeds of this variety produced in 1852 seedlings were grown in 1853, one of which was introduced in 1857 as the Garnet Chili. This may be regarded as the first definitely recorded effort in this country to produce a new variety of potato for the purpose of acquiring greater vigor and more marked resistance to disease. Whether this acquisition may be regarded as a strictly scientific accomplishment it is not my purpose to discuss; the real merit of the work lies in the fact that it was the beginning of a distinctive American line, if we may so term it, of commercial varieties of potatoes. This is beyond all question the most important phase of Goodrich's work. While he originated other varieties such as the Calico, Cusco, Early Goodrich, etc., the Garnet Chili alone stands out as the stepping stone as it were of subsequent varieties. The Early Rose, Beauty of Hebron, King of the Earlies, Peerless, Prolific and others were produced from naturally fertilized seed balls of the Garnet Chili, and the Burbank and Early Ohio were produced in a similar manner from the Early Rose. The Burbank,

* An address at the tenth annual meeting of the Potato Association of America, at Cincinatti, Ohio, December, 1923.

Early Ohio and Peerless (Pearl) are more or less extensively grown in a commercial manner today. The Early Rose is less extensively grown, being confined to small areas.

SECOND PERIOD

The outstanding features of the second period—1876 to 1900—are the appearance of the Colorado potato beetle in the potato fields of the Northeastern portion of the United States, an increasing knowledge concerning plant diseases particularly early and late blight, and common scab; the development of insecticides and fungicides; the gradual evolution of a spray technic thereby involving the perfection of spraying equipment; determination of the kind, time, and rate of application to secure the most effective results; the development of the automatic horse-drawn potato planter and the elevator type of digger; and the origination and introduction of additional varieties of potatoes.

The Colorado Potato Beetle

Those of us who are well past the half century mark and who were brought up on the farm well remember the more or less panicky feeling of the potato grower when the Colorado beetle became numerous enough to threaten the complete destruction of the potato plant before its tubers were formed. They also retain vivid recollections of the tedious and more or less repulsive task of freeing the plants of both the mature beetle and its larvae by hand picking them. Soon, however, science stepped in and furnished the grower with poisonous insecticides which very quickly became extensively used though not without serious mishaps at first, such as severe injury to the foliage through the caustic action of free arsenious acid in the poisonous compounds employed. Happily for the potato industry science again came to the rescue by determining the cause and providing a remedy in the neutralization of the free arsenious acid by the addition of lime to the poison mixture.

Potato Diseases

The development of the compound microscope coupled with the employment of culture medias in the artificial reproduction of plant or animal disease organisms has made it possible for the trained scientist to study the life history of the more prevalent forms of disease attacking the potato plant or tuber. It has also enabled them to employ remedial or control measures to eradicate or hold them in check.

Development of Insecticidal and Fungicidal Compounds

Soon after the advent of the Colorado potato beetle, in considerable numbers at least, science came to the rescue of the potato grower by furnishing him with arsenical poisons to be applied to the foliage of the plants for the purpose of destroying this and other leaf-chewing insects. This marked a distinct advance in the control of foliage destroying pests, and relieved the grower of the onerous task of hand picking them. London purple and Paris green were the first to be employed. The former owing to the wide variability of its arsenical content was soon superseded by Paris green.

Bordeaux Mixture

The accidental discovery by Millardet in France in 1882 that when a solution of copper sulphate was added to milk of lime it possessed strong fungicidal properties, can, without serious question, be regarded as the epoch-making event of the period under discussion, at least insofar as it relates to the potato crop. The history of its discovery is too well known to require further comment but it may not be inappropriate at this time to give some attention to the name first applied to it and to the strength of the mixture first employed. When it was discovered that a mixture of a solution of copper sulphate and milk of lime was applied to the foliage of the grapevines it prevented injury to the leaves from the downy mildew, the name "bouille bordelaise" was applied to this fungicide. This name did not, however, persist very many years as it was known in this country at least as early as 1889 as Bordeaux mixture. The original strength of the mixture contained approximately ten times as much copper sulphate and over nine times as much lime as does our standard 5-5-50 formula of today. The formula in general use in this country in 1889 and 1890 and one which the writer used in the latter year

called for six pounds of copper sulphate and four pounds of lime to 22 gallons of water. Notwithstanding the fact that about 55 years have elapsed since Bordeaux mixture was first successfully used in this country for the control of late blight it still remains the best fungicidal preparation for the prevention of this disease.

Seed Disinfection

The development by Bolley in 1889-90 of a successful practice for the disinfection of seed potatoes affected with common scab, through immersion of the tubers in a corrosive sublimate solution, marked a distinct advance in the control of scab. The later use of formalin (1897) for the same purpose was a natural result of the first method of treatment and made possible the use of a non-poisonous non-corrosive substance with equally good results so far as its effect against common scab is concerned. The cause of common scab was not definitely known until about 1890 and would not have been possible then except for the development of better microscopes and improved laboratory technic.

Spray Equipment

Prior to 1885 the demand for spray equipment was not sufficient to stimulate manufacturers to any great effort along the line of improvements in sprayers. The knapsack sprayer and barrel force pump were in use to some extent in 1889. In 1890 it was my good fortune or misfortune as the case may be to use a knapsack sprayer in the spraying of some fruit trees and a watering pot with a rather coarse rose in spraying an experimental plot of potatoes with Bordeaux mixture. The year following some experimental spraying was done in commercial fields of potatoes. Traction sprayers were a product of the late 90's. As a result of careful scientific study much was learned regarding the best strength of materials to use in the control of insect pests and fungous diseases and in regard to the time, frequency, and rate of application to secure best results.

Potato Implements

Along with the improvement in spray equipment came similar advances in the development of planting and harvesting implements. During these years hand planting and hand digging implements were supplanted by automatic horse drawn planters that opened the furrow, dropped the seed piece and ridged the soil over it all in one operation. The elevator type of digger had relieved the grower of the back-aching practice of hand digging and had made possible a very distinct saving in the labor cost of harvesting a commercial field of potatoes.

Cultivators—Two-horse cultivators were also a product of this period.

New Varieties

Between 1875 and 1900 some of our most valuable commercial varieties were developed, introduced and widely grown commercially. The more important of these are the Burbank, Early Ohio, Green Mountain, and the Rural varieties represented by the Rural New Yorker No. 2, Carman No. 3 and Sir Walter Raleigh. These varieties are of especial interest because they are extensively grown today. The Green Mountain and Rural Varieties represent our leading medium to late maturing varieties in the Northeastern United States. In my estimation E. S. Carman's contribution of Rural New Yorker No. 2, Carman No. 3, and Sir Walter Raleigh has never been adequately recognized. The Rural group of potatoes represents a distinct and hardy race of plants possessing considerable foliage resistant to disease and marked ability to withstand heat and drought. This group of potatoes is especially adapted to the warmer and drier sections of the states of New York, Pennsylvania, Ohio, Indiana, Michigan, Wisconsin, Minnesota and Iowa.

THIRD PERIOD

The outstanding features of the third period (or from 1900 - 1923) are in my judgment the potato breeding craze that swept Great Britain and to a greater or lesser extent European countries during the first few years of the twentieth century. The years 1904 and 1905 probably witnessed the greatest excitement among potato specialists, fabulous prices being paid for some of the new varieties. This renewed interest in the potato was the direct result of claims made by certain potato breeders and seedsmen that seedlings they had produced or were introducing for the first time possessed either complete or almost complete immunity to the late blight

disease. In some few cases these claims were not without some foundation in fact, but in the majority of them the resistance factor was apparently absent.

America's Reaction

As a natural result of this potato craze abroad the more progressive potato growers in this country woke up to the fact that resistance to disease was not receiving the attention it should by those who were engaged in originating new varieties. Considerable interest was, therefore, taken by a few plant breeders but without any appreciable success except that of accumulating many interesting observations.

Another important feature of this period was that of establishing the group system of classifying potato varieties. This has done more than any other one thing toward reducing the numbers of so-called varieties offered by seedsmen. Coupled with the systematic classification of varieties into distinct groups having similar characters has come the widespread propaganda looking toward the standardization of our commercial varieties of potatoes. This has resulted in a much desired tendency to reduce the number of varieties grown in a given community and has made possible the purchase of carload lots of a single variety at most shipping points.

Seed Potato Inspection and Certification

The inspection and certification of seed potatoes had its inception in this country in 1914 when the state of Wisconsin offered such a service to its potato growers. That such a service has been of benefit to the potato industry of this country is amply justified by the fact that it is now offered by approximately half the states in the Union. The benefits resulting from this effort to produce better seed can hardly be estimated; one can perhaps best judge these results by the increased demand for certified seed potatoes on the part of the Southern grower who is dependent upon Northern grown seed. A few years ago these growers were unwilling to pay a premium for such seed. To them potatoes of a given variety were all of equal value. Today this attitude toward good seed is entirely different.

Strain Superiority

It has taken about a decade to convert potato growers to the idea that all lots of seed of the same variety, even if on a parity so far as diseases were concerned, do not have the same reproductive capacity. Careful comparisons of many strains by many observers in different localities and under different climatic conditions have demonstrated beyond any possibility of refutation that certain strains are very much heavier yielders than are others of apparently equal merit so far as outward appearances are concerned. These studies have now extended over a sufficiently long period to justify the prediction that in the near future the purchaser will be stipulating that he wants Bill Jones' rather than Bob Smith's stock of Triumphs or Cobblers. He will make this stipulation because his neighbor has had excellent results from the use of Bill Jones' seed, while it may be that he himself had a poor yield from Bob Smith's stock. Those who are most closely in touch with this work are fully convinced that the prediction just made has been sufficiently borne out in actual practice as to be no longer in the category of probability but rather may be regarded as a demonstrated fact. Our task is that of broadcasting this information with the idea of securing its wider and more general acceptance. The recognition of strain superiority is of course an outgrowth of the seed potato certification work and should not ordinarily be considered as a separate line of effort in the production of superior quality seed stock. Our only object in so considering it in this paper was that of emphasizing the variation in the productivity of different strains when grown side by side under identical soil and cultural conditions. The present discussion would not be complete were we to neglect mentioning the obvious trend of seed certification work. In our humble judgment this work has progressed sufficiently far to demonstrate that we are going to have two classes or groups of certified seed potato growers; (1) a small group growing a superior strain of seed, the vigor and freedom from disease of which they are maintaining through carefully rogued seed plots; (2) the other and by far the larger group embraces a type of grower who plants and properly cares for his growing crop but is not willing to maintain a seed plot or to ex-

ercise the care necessary to the proper roguing of his fields to prevent spread of disease. This class of growers will be obliged to look to the first group for the renewal of his seed stock before it shows a larger percentage of diseased plants than is allowable under the seed certification rules.

Discovery of New Diseases

Since 1900 many new potato diseases have been noted and studied by the plant pathologist. In fact the past ten years have witnessed greater progress in the identification of potato diseases than in any similar period in our history. The so-called degeneration of potatoes is now regarded more or less as a misconception on our part as to the cause of degeneration. We now know that mosaic, leafroll, spindle tuber, streak, curly dwarf, giant hill, etc., are all contributing factors to the breaking down of the vigor of the plant. While no specific organism has yet been isolated from plants infected with the above mentioned diseases it has been conclusively demonstrated that these troubles can be transmitted from diseased to healthy plants either artificially or through natural means as for example by means of sucking insects such as plant lice, leaf hoppers, and possibly other agents. Possession of this information makes it possible in selection work or in the development of seedlings to proceed with a much larger degree of intelligence than has heretofore been possible. The tuber index method of eliminating diseased tubers also offers another means of isolating disease free and promising tuber progenies.

This paper would hardly be complete if some mention were not made of the part that transportation agencies have played in the development of the potato industry in this country. Improved railway and water transportation facilities have made possible during the past half century the development of large early potato production centers in the South and the prompt delivery of the crop to Northern markets. It has also made possible the development of a large potato industry in Northern Minnesota, Wisconsin, Maine, Colorado and other sections.

Insect Studies

It is difficult to estimate the part the entomologists have played in the control of insect and animal parasites of the potato. The knowledge we now have has come to us so gradually that we do not fully appreciate its importance and value in the control of these pests. All will agree, that in order to control any insect or animal pest it is first essential that we know its life history, how it feeds, and what parts of the plant it uses for its substance. This knowledge is essential to an intelligent attempt to destroy it, or to repel it. Fortunately the entomologist has secured this data and made it available to all who will take the trouble to study it.

In conclusion let us not forget the part that science has played in the development of our national industries, and particularly the especial relation that it bears to the potato industry as a whole.

FEDERAL GRANT DISCONTINUED

Almost coincident with the mailing of our last issue, the Provincial Ministers of Agriculture received official notification from the Hon. W. R. Motherwell that no further financial assistance could be expected from the Federal Government under the Agricultural Instruction Act of 1913. It was explained that this action had been considered a necessary part of the Government's efforts to make the budget balance, and it was thought that an early notification would give each province an opportunity, before March 31st, to make whatever adjustments might be considered necessary.

The C.S.T.A. and most of the provincial Departments of Agriculture have spent a great deal of time and effort in an attempt to ensure a continuance of the grant, and to them the result is particularly disappointing. The likelihood of protests from the Conservative and Progressive members in the House of Commons being effective is extremely doubtful, and it may almost safely be assumed that the grant is now a dead issue.

In the provinces of Ontario and Quebec little effect will be noticed. Both provinces will probably carry on, at their own expense, the work which was started with Federal aid. But in the provinces east of Quebec and west of Ontario, a serious curtailment of activities is expected—in fact is already apparent.

Factors in Live Stock Experimental Work.*

J. P. SACKVILLE

Professor of Animal Husbandry, University of Alberta, Edmonton.

I am sure we all appreciate the opportunities there are in the province of Alberta for the development of the livestock industry. While I have been in the province only a little more than one year, and have not yet had the opportunity of seeing all sections of it, I am sufficiently familiar with conditions to realize the possibilities there are for the future progress of the business. Many of you know the province much better than I, and I fully expect that you are just as enthusiastic regarding the province from the standpoint of livestock progress. With our natural advantages in the way of cheap land, coupled with such a favorable all-year climate, and abundance of cheap, suitable feeds, the future outlook is encouraging. It is also true that the animals produced under conditions such as we have here tend to develop a rugged type comparatively free from disease.

Not only are conditions favorable for livestock production, but it is a fact that the future progress agriculturally, of this or any other country, is very closely linked up with maintaining on our farms a reasonable number of livestock of good quality.

There are, according to the 1922 report of the Dominion Bureau of Statistics, 1,653,042 head of cattle, 260,366 head of sheep, and 623,188 head of hogs in this province. The total value of these animals is a little over $40,000,000. The per head value of the various classes is estimated at $30 for cattle, $7 for sheep and $12 for hogs. Alberta stands third as compared to the other provinces in the Dominion in the number of cattle, sheep and hogs.

It is realized that there is considerable capital tied up in the livestock industry in this province. For this reason, together with the fact that it is in the best interests to increase the number of farm animals, it is desirable that everything possible should be done to place the entire industry on a better financial basis. This means the improvement of the quality of the animals maintained and perhaps more particularly, better feeding and management methods in connection with these animals. While I am in complete accord with those who aim to improve the returns from livestock through better breeding, at the same time I am convinced that possibly just as valuable work can be done by improved methods of feeding.

The point I am endeavouring to make is that experimental work has a very important bearing on the improvement and progress of the livestock interests in any country. As applied to conditions in the province of Alberta, one is justified in saying that experimental work with the object of obtaining information on improved feeding methods, is particularly pressing. It is true that much valuable work has been accomplished in other provinces and states, the results of which are available. At the same time the conditions in Alberta in respect to crops produced and feeds available for feeding, climatic conditions, type of farming and other factors are in many cases so different that it is necessary to conduct work along such lines as will produce results adapted to conditions as we find them here.

In spite of the fact that we are a comparatively young province, I am not unmindful that a great deal of valuable experimental work in livestock, and for that matter along other lines, has been done, and I should like at this point to pay a tribute to those who have been instrumental in accomplishing the work—the Dominion Experimental Farms, the Canadian Pacific Railway, the Provincial Department of Agriculture, as well as others. I consider too, that I can say without appearing to be immodest, that the Provincial University has also had some share in helping on the good work. It does, however, take time to conduct livestock experimental work

*An address before the Alberta Branch, C.S.T.A., November, 1923.

and carry it through to the stage when one is safe in reporting results. As I have already suggested, we are yet a young country, still in more or less of the pioneer stage, and there is still a great deal to be accomplished.

There is another feature in this connection I should like to mention, as it relates to the importance of progress in experimental work, and that is that every year there is an increasing demand from farmers for accurate, up-to-date information on better livestock methods. This is encouraging and is surely a sign that such work is not only being appreciated, but is also worth while.

With your permission I should like to outline very briefly some of the problems we are investigating at the University of Alberta. I wish to do this with a distinct purpose in mind. In the first place, I want to assure you that we feel that such an organization as this has a direct interest in the experimental work that is in progress in the province, and further, that we invite your suggestions and co-operation and friendly interest in all the work we are trying to do.

Problems Under Investigation

Feeds and Method of Feeding as they Affect the Type of Hog and Quality of Carcass.

Forage Crops for Swine.

Summer Feeding of Brood Sows.

Rye vs. Barley for Finishing Hogs.

Inside vs. Outside Feeding for Hogs.

Comparison of Oat hay, Prairie hay, Timothy hay and Alfalfa for feeding ewes.

Effect of forcing pregnant ewes to utilize snow instead of water.

Comparison of Prairie hay, Timothy hay and Alfalfa for feeding fattening lambs.

Feeding experiments with the object of finding the most suitable supplement to be fed with Oat hay for pregnant ewes.

Comparison of Oat silage and Sunflower silage for feeding pregnant ewes.

Comparison of Oat Hay and Prairie hay for feeding pregnant ewes.

Effect of different pregnancy rations on the prevalence of goitre.

The effect on growth and breeding capacity when sheep are bred as lambs instead of yearlings.

Value of silage for fattening steers.

Comparison of yearling, two-year-olds and three-year-old steers from standpoint of economy of gains.

Full feed vs. limited grain feeding for fattening steers.

Value of oilmeal as a supplement to the common farm grains for fattening steers.

While some of this work has been in progress for some time, as yet only two publications are available, which I presume most of you have already seen. You realize, and I have mentioned this fact before, that it takes considerable time to complete results satisfactorily; we hope, however, to have other bulletins published just as soon as we feel the results justify it.

There is one phase of livestock experimental work that I think has been of considerable concern to everyone who is engaged in it, and I think is well worthy of consideration, as it is the real basis after all, of success. More or less criticism has been directed at Experimental Stations and those responsible for the conducting and reporting of experimental work, with reference to the conflicting information that is reported from time to time. One can quite understand the attitude of those who depend upon the published data from such sources for guidance. While it is true much of this criticism is not justified, nevertheless the fact remains that it has been a factor in discrediting much good work, and it should be the aim of those concerned to minimize as far as possible the chances for such criticism.

It is true that no matter how carefully feeding trials may be outlined and conducted, there will always be uncontrollable factors that will make absolutely uniform results impossible. In livestock feeding work, for example, we are dealing with subjects that differ in functional activities such as feeding capacity, vitality, previous treatment and various factors that go to make up individuality. In addition to the individualities of the experimental animals there must be included the environmental conditions such as the weather and the personality of the attendant. This is quite clear to anyone and is apparent in respect to individual gains made

by animals on the same feed and under similar conditions. These are factors that it is impossible to control, and unquestionably are responsible for the variations that are noted in reporting feeding trials carried out under reasonably uniform conditions.

There are, however, other important factors that can be controlled in connection with feeding trials; these conditions consist, for instance, in the rations fed, the preparation of the rations, the methods and time of feeding, the value put on the feed, the method of shelter, weighing and exercising the animals, the season at which the experiment was run, and the age and number of animals used in each experimental lot. If the feeding experiments are repeated or even conducted at different stations, it is possible to maintain these conditions reasonably constant.

Take the matter of variability in the composition of feeding stuffs. It is recognized that feeds produced in different sections vary considerably in their composition. This is particularly true in the case of the moisture, ash and protein content. As applied to roughages the difference is even more marked, as the manner in which such feeds are cured and the stage of maturity at which they are cut influence to a large extent their actual feeding value. The average analyses as used in reporting many feeding trials, can be applied only in a very limited way. In order to place experimental work on a uniform basis so that results can be accurately interpreted, it would appear that it would be an advantage to have a chemical analysis made of the feeding stuffs used in each case, and reported along with the other data.

The question of the number of animals to be used in each experimental group, is worthy of consideration. It is stated by those who have studied this question that in most experiments where the object is to determine the relative feeding value of say two or more rations, not less than ten animals should constitute each lot.

Even under the most favorable conditions it is desirable to conduct at least three trials under as uniform conditions as possible before publishing the results. The difficulty of securing similar results in repeated trials is appreciated by those who have conducted experimental work, and points very clearly to the danger of reporting on the results of one trial only. Then there is the matter of the age and sex of the animals, as well as the various other factors that go to influence feeding trials.

It is so obvious that even under conditions where the work is conducted and reported as carefully as humanly possible, there is so much probability of error in feeding trials that it is most important to have all experimental work on a standardized basis.

Keeping in mind the need of some uniform and satisfactory basis for the conducting of livestock experimental work in order to make it of greater service to those for whom it is conducted, I should like to make the suggestion that all those engaged in such work in Canada should arrange to meet with the view of working out some mutually agreeable basis for conducting and reporting livestock experimental work.

THE O.A.C. SEMI-CENTENNIAL

During the entire week of June 9th, 1924, the Semi-centennial of the Ontario Agricultural College will be celebrated. Several committees are now actively engaged in the preparation of a suitable programme and efforts are being made to encourage all former students of the institution to visit the College and to take part in the festivities. These will include the opening of the Memorial Hall, class re-unions, pageantry, banquets, etc. The Canadian Society of Technical Agriculturists will hold its fourth annual convention at the College during the same week and is arranging a series of graduate lectures in (1) Field Husbandry and Plant Breeding; (2) Animal Nutrition and Animal Pathology; (3) Horticulture, Plant Pathology and Entomology; (4) Economics. The best men available will be secured for these four courses of lectures, which will run concurrently.

A complete programme will be published in an early issue of *Scientific Agriculture*.

The Co-operative Marketing of Milk and Milk Products.*

W. L. MACKEN

Director, Fraser Valley Milk Producers' Association, Chilliwack, B.C.

The marketing of farm products is a subject in which I have been keenly interested for several years, and although my connection with the Directorate of the Fraser Valley Milk Producers' Association dates back only to the spring of this year, I have nevertheless, during the past fifteen years been more or less intimately connected with co-operative marketing efforts, both in the dairy and fruit branches of agriculture. I have, therefore, some experience as well as some theory in and upon this phase of our economic life which is today so prominently before the agricultural industry of America.

Before dealing specifically with my subject, may I say that to one really interested, a study of the marketing of farm products along co-operative lines, opens up vast possibilities. I do not claim that it is a panacea for all agricultural ills; in fact, I am convinced that agriculture, or at least some of its branches, is suffering even more from faulty, loose methods of production resulting in altogether too high costs, than from inadequate marketing methods, but for the time being I believe we will have to hearten the producer by getting for him a little more out of the consumers' dollars, and by and by, we will tackle this basic trouble from which he is suffering.

By reason of his occupation and environment, the farmer is an individualist, and as a producer he will always be such even though methods may be introduced which may tend to make production uniform. The great difficulty which faces him as an individualist, however, in finding a market for his product, is that he comes in contact with thousands of others situated just like him, each of whom is acuated by exactly the same desire as actuates him; namely, to get for his product a price sufficient to return the cost of production plus a profit. It is possible for manufacturing concerns to have price and trade arrangements, also for wholesalers and retailers and even for professional men, but the diversity of agricultural products, and the number of individuals engaged in the agricultural effort, make it impossible for the farmer to conclude such arrangements with his fellow farmers as individuals. The only plan open to him, therefore, is organization into groups or classes controlled by men from his own ranks, and created for the purpose of finding a market for the combined products of those who form the group. This we have come to know as co-operative marketing.

There are a few cardinal principles upon which co-operative marketing is built, but in my judgment the most important, and the most far-reaching in its effect of these principles, is the willingness of the individual to bear a portion of his neighbor's burden, not to add to that burden. In my humble opinion, humanity today is suffering intensely from individual selfishness and greed. It is evident in all departments of life, not excluding our religious life. If, therefore, through co-operative marketing we can inculcate in the minds of the people, who work at the very foundation of our economic life, this willingness to help each other, we are introducing an influence which in time will leaven the whole lump, and it is not too much to hope that the ultimate effect of co-operative marketing will be to clear away much of the prejudice which today exists between peoples by reason of a lack of knowledge of the problems, of each other, and thus bring together in a more friendly and helpful way all classes of society.

I maintain that co-operative marketing must not stop at getting for its own people a better price for their products. It must reach out to the consumer and get these products to him at the least possible cost consistent with a fair return for the investment

*An address before the B. C. Branch of the C.S.T.A. at Vancouver, October, 1923.

of time and money to those who are engaged in the basic industry of production of food stuffs. Truly, this seems to me to be a lofty ideal and worthy of the thought of the best brains in our land. Do not misunderstand me in stressing this operation of supplying food stuffs by one section of the community to the other. I am mindful that man does not live by bread alone, and our material welfare must not be considered greater than our spiritual welfare; but I also know that if we do not supply man with bread it is a question of but a short time until we can do nothing for him spiritually. Hence, in my judgment, the importance of the operation.

Just here may I point out the need for the urban dweller to become more interested in the problems of the farmer. The latter can exist, if he has to, upon the products of his farm, but the former would speedily starve should the buying power of the farmer be reduced to the vanishing point. This problem of the marketing of farm products is therefore vital to organized business, and even affects the humblest wage earner.

Coming directly to my subject, might I remind you that co-operative marketing started with a dairy product nearly 300 years ago, in Switzerland when Swiss farmers formed little groups to manufacture and market cheese together. It was two centuries later before agricultural co-operation reached America, and it is note-worthy that here again it began with cheese. As early as 1810 efforts were made to market cheese co-operatively, but it was not until 1841 that any degree of success was attained. It may interest you to know that the first recorded successful cheese co-operative marketing effort was started by a man who had 10 cows and four of his neighbors who had 20 cows among them. The 30 cows were pastured together, driven to one man's yard at night and milked by their respective owners. The milk belonging to each owner was carefully weighed and credited to him, and the results of the season's operations were apportioned accordingly. No doubt at that time this effort would be hailed as a wonderful achievement, but in the light of subsequent achievement along the lines of co-operative marketing of dairy products, it is as a tiny star in the Heavens. From this meagre start there has grown up a vast array of co-operative dairy institutions all over the American Continent, ranging from the cross-roads cheese factory, with which so many Ontario men are familiar, to the gigantic milk organization known as the "Dairymen's League Co-operative of New York State." This institution, during the year ending March 31st, 1922, handled over two and one-half billion pounds of milk, and distributed two and one-half million dollars to over 65,000 members. In between are numerous excellent organizations which have achieved outstanding success, such as the Twin City Milk Producers' Association of St. Paul, Minnesota of over 4,000 members; the New England with over 20,000 members, the Chicago with over 6,500 members; and without wishing to be boastful, our own Fraser Valley Milk Producers' Association with its 2,000 members. Some of these organizations have been content to manufacture only, some to manufacture and wholesale, and some to manufacture, wholesale and retail; and while many disasters are recorded in this field of endeavor, and while many lessons have yet to be learned, there is not a doubt that the day is fast approaching when the enormous gap existing hitherto between producers and consumers of farm products, will be reduced to the minimum by the functioning of co-operative marketing organizations.

Because I believe that the experience of one institution will be largely the experience of another, and because I can speak from a definite contact with the subject, I would like, with your permission, to outline briefly a few features of interest and importance in the career of the Fraser Valley Milk Producers' Association, which I believe is generally conceded to be one of the most successful co-operative dairy marketing concerns in Canada. This Organization actually commenced to do a milk business in 1916. It was organized in 1913, but before it could get under way the war broke out and for a couple of years, very little attention was paid to anything but the war activities. In 1916, however, the then Directors again took up the work of organizing the farmers and they were successful to the point of forcing recognition by the City milk dealers. The producer began to have something to say about the price he was to receive for his milk. The membership of the organization grew steadily and the power it held, increased, but the operations

were confined entirely to wholesaling to the milk dealers.

Then there came a time when, owing to the closing down of condensing plants in Washington, heavy supplies of milk were available from South of the line and the dealers became quite independent. They intimated that they could get their supply from across the line and thus ignore the local producer. While this may have been merely a threat, it served to awaken our organization to the need of a weapon of defense and steps were taken to extend the scope of our operations into the actual distribution of milk to the consumer. This step occasioned a great deal of controversy. Of course, it met with bitter hostility from the city dealers and quite a percentage of our members were of the opinion that the move was unwise. It was contended that to carry on a wholesale business with distributors and at the same time compete with them in the distributing field, was not good business ethics and could not succeed. The cry of the dealer was that he had certain rights, having been in the field prior to the creation of our Association.

Desiring to be fair, I have looked at this phase of our business from every angle and I am thoroughly convinced that the move was sound. In fact, I would like to make it clear that in my judgment, co-operative marketing, as applied to dairy products, will not achieve its fullest measure of success until it does undertake this distribution to the consumer whenever it is possible.

Our production is steadily increasing, consequently we must encourage an increase in consumption. The surest way to do this is to keep the price to the consumer as low as possible and in order to do this, we simply cannot afford to pay any more profits or incur any extra handling costs which can be avoided. In other words, we are concerned in but one profit, that to the producer; after that, all we seek is the actual cost of getting our commodity across to the consumer. This is where our system clashes with the city dealer; he wants his cost of operation plus a profit, and usually he is none too particular how high his costs are so long as somebody else is willing to pay them. When we begin to squeeze his margin, he introduces his cry about his right to live. My answer to this is that, had the producer not been in existence first, there would have been no city dealer. He had things his own way for many years: he might have done more for producer and consumer had he tried, but he did not try. His system was thoroughly tried out and was found wanting and having had his chance, he should not complain or expect society to maintain him when a more efficient system comes into existence. There are those who contend that co-operative organizations cannot hope to keep their costs of operation as low as privately owned businesses, but in our case, if we are to believe the statements of our city dealer friends, we have them beaten by a considerable margin and there are yet costs which we believe we can eliminate.

The question in our mind is this: in which direction does our duty lie? First, of course, to our members and second, to a handful of dealers? or to thousands of consumers? So far, we believe it is to the consumer. This may be a cruel doctrine and may not find favor in your eyes. I am not urging it for your acceptance, but I merely suggest that if dry rot sets in on your trees, you cut out the rot; if your toe develops gangrene, you cut off the toe. The tree or the body should not suffer for the benefit of the rot or the sore spot. And so, we are firmly entrenched in the retail distribution of milk and we are determined to carry the message of our purpose into the hearts and homes of our consumers until they will double and then treble their consumption. Nor do we stop at milk. We have sold as high as 50,000 lbs. of butter per month off our wagons direct to our consumers and we are planning now to extend this service to every line we handle. Today we are supplying at least 60% of the milk sold at retail in Vancouver, and 50% at wholesale of the balance of retail distribution.

Now, I would not have you feel that this organization of ours has not had its difficulties. I assure you, quite the contrary is the case. During the years when prices were high, due to war activities, the Dairy industry was affected, along with other lines, and the prices which we received for butterfat were very high. This brought about a condition of expansion and extravagant living on the part of our people, as it did in practically every other line of industry and when

the period of deflation came along, we found it hard to get back to pre-war prices. We found it hard for various reasons; extravagant habits are usually pleasant and we are loath to give them up, but in the case of the dairy farmer his costs of production due to the price which he had to pay for the various things he had to buy, did not come down in proportion to the selling price of milk and costs of distribution. Dissatisfaction with his Association began to manifest itself and unfortunately both for the membership and the executive, the tenor of this dissatisfaction was not sufficiently appreciated by those charged with the responsibility of directing the Association's business. This lack of sympathy, aided by the strenuous effort put forth by city milk dealers to discredit the Association, had its effect, and there was a time when many strong supporters of our organization looked forward with apprehension to the future. The member began to question the value of co-operation, and since it is essential that those participating in a co-operative marketing effort be thoroughly and continuously sold on the idea, this questioning became serious and threatened the very life of the Association. At this point, and because I believe it is one on which many co-operative institutions go wrong, I would like to stress the absolute necessity of having a man at the head of a co-operative marketing concern who is sincerely in sympathy with the principle upon which the organization is founded, and who believes implicitly in the reason for its existence. It is necessary, of course, that the best brains available be hired to carry on the various details of marketing, but in the matter of policy as relating particularly to member, the control, I maintain, should always be in the hands of directors who have come up through the ranks of the industry, who know the problems of the producer and whose first interests are those of the producer. Such a man should not be merely on the job casually but should be on the job constantly, so that the finger of the farmer should always be on the pulse of the business.

To be a successful executive of a co-operative marketing concern, a man must have extraordinary qualifications. He must have the ability to inspire his members with confidence in the organization; he must have the willingness and frankness to keep his membership always fully acquainted with what is being done in their behalf; and he must also be ready and able to meet the onslaughts of organized, privately owned business which is ever seeking to discredit and destroy co-operative enterprises.

In our city operations, by the changes made, we were able to make a considerable saving of money, but this saving is nothing compared with the saving which could be made both to producer and consumer by the eliminating of wasteful duplication in the distribution of milk throughout the city. The only cure was the regulation of distribution, and this could only be obtained by consolidating the producer. Our campaign in the country was very successful and to-day we are in the splendid position of having 95% of the dairy farmers of the Fraser Valley in our Association. This gives us a splendid power, but we shall be careful not to even attempt to abuse this power. We must make it work for the benefit of both parties to our operation, the consumer as well as the producer.

It is our intention, by careful inspection and by education, to improve the quality of our products, and by regulation of distribution to cut down costs to the end that we may get our stuff across to the consumer at the lowest possible cost to him, consistent with a fair return to our members. Our whole marketing organization is imbued with the spirit of accomplishing this two-fold purpose, and I commend the idea to all similar organizations.

Strawberry Breeding at the Ontario Horticultural Experiment Station.

W. J. STRONG

Horticultural Experiment Station, Vineland, Ont.

Strawberry breeding was started at this station in 1913 with the following ideal in mind—"The production of a strawberry with the quality of the Brandywine, the earliness of Early Ozark and the firmness of Williams (of Ontario) combined in one berry without the undesirable qualities of each."

The following table shows the principal crosses made from 1913 to 1915 inclusive together with the number of seedlings grown from each cross and the number that looked promising in 1920, 1922 and 1923.

TABLE I.

Column A—Number of seedlings set out in 1914-15-16.
Column B—Promising seedlings in 1920-22-23.

Crosses Made in 1913-14-15.	A.	B.	Remarks
Bubach x Early Ozark	308		
x Brandywine	246		
x Senator Dunlap	182		
x Michels Early	14		
x Pocomoke	22		
	772		
Pocomoke x Michels Early	67		
" x Williams	64		
" x Senator Dunlap	158		
" x Early Ozark	267	3	1 Seedling (early) propagated 1923.
" x Brandywine	5		
	561		
St. Louis Prize x Williams	257		
" " " x Early Ozark	57		
" " " x Brandywine	8		
" " " x Joe	112		
	434		
Senator Dunlap x Early Ozark	404	6	3 Seedlings (mid season) propagated 1923.
" " x Brandywine	39	1	discarded 1923.
" " x Williams	90	1	"
" " x Pocomoke	20	1	"
	553		

Williams x Brandywine	1318		
" x Early Ozark	391	3	To be propagated 1924
" x Michels Early	187		1 discarded 1923.
" x Pocomoke	176		
" x Senator Dunlap	315		
" x Parson's Beauty	223	1	Discarded in 1923.
" x Joe	196	1	" " "
	2806		
Brandywine x Williams	381		
" x Early Ozark	104		
" x Michels Early	412	1	Discarded in 1923.
" x Pocomoke	72		
" x Senator Dunlap	23		
	992		
Sample x Michels Early	92		
" x Pocomoke	43		
" x Early Ozark	143	1	1 seedling (midseason)
" x Brandywine	36		propagated 1923.
" x Senator Dunlap	396	1	Discarded in 1923.
" x Williams	68		
	778		
Early Ozark x Williams	243	2	To be propagated in 1924.
" " x Brandywine	15		
" " x Pocomoke	2		
" " x Senator Dunlap	12		
" " x Michels Early	88	1	1 seedling (early) Prop. 1923
	360		
Michels Early x Senator Dunlap	26		
" " x Pocomoke	84		
" " x Brandywine	511		
" " x Early Ozark	41		
" " x Williams	76		
	738		
Parsons Beauty x Michels Early	86		
" " x Early Ozark	49		
" " x Brandywine	290		
" " x Williams	46		
	471		
Joe x Williams	446	1	Discarded in 1923.
" x St. Louis Prize	89	1	1 seedling (late) prop. 1923.
	535		
Nettie x Williams	219	1	1 seedling (late) prop. 1923.
Total	(9219)		

It will be observed from the preceding table that 12 varieties were used in making 53 crosses including 17 reciprocals and out of 9219 seedlings set out there are 12 that seem worth while carrying on.

It is interesting and perhaps instructive to note from which crosses the promising seedlings were derived.

These crosses were as follows:

TABLE 2.

	Promising Seedlings						
Pocomoke x Early Ozark	1	(early)	out	of	267	seedlings	grown.
Senator Dunlap x Early Ozark	3	(mid)	"	"	404	"	"
Williams x Early Ozark	2	(mid)	"	"	391	"	"
Sample x Early Ozark	1	(mid)	"	"	143	"	"
Early Ozark x Michels Early	1	(early)	"	"	88	"	"
Early Ozark x Williams	2	(mid)	"	"	243	"	"
Joe x St. Louis Prize	1	(late)	"	"	89	"	"
Nettie x Williams	1	(late)	"	"	219	"	"

It will be seen from this table that varieties differ in the number of promising seedlings that they give, as for example: Early Ozark was a parent 5 times, Senator Dunlap 3 times and the other varieties once each, but this is not conclusive evidence that Early Ozark is superior to Williams or that Williams is superior to Senator Dunlap, or that any of these are superior to the rest as parents.

In order to form a better idea of the value of these varieties as parents we should also know how many times they appear as parents in the total number of seedlings grown to give us the number of good seedlings obtained.

The following table shows the number of times each variety was present in the total number of seedlings grown with the actual number of promising seedlings obtained and the percentage number.

TABLE 3.

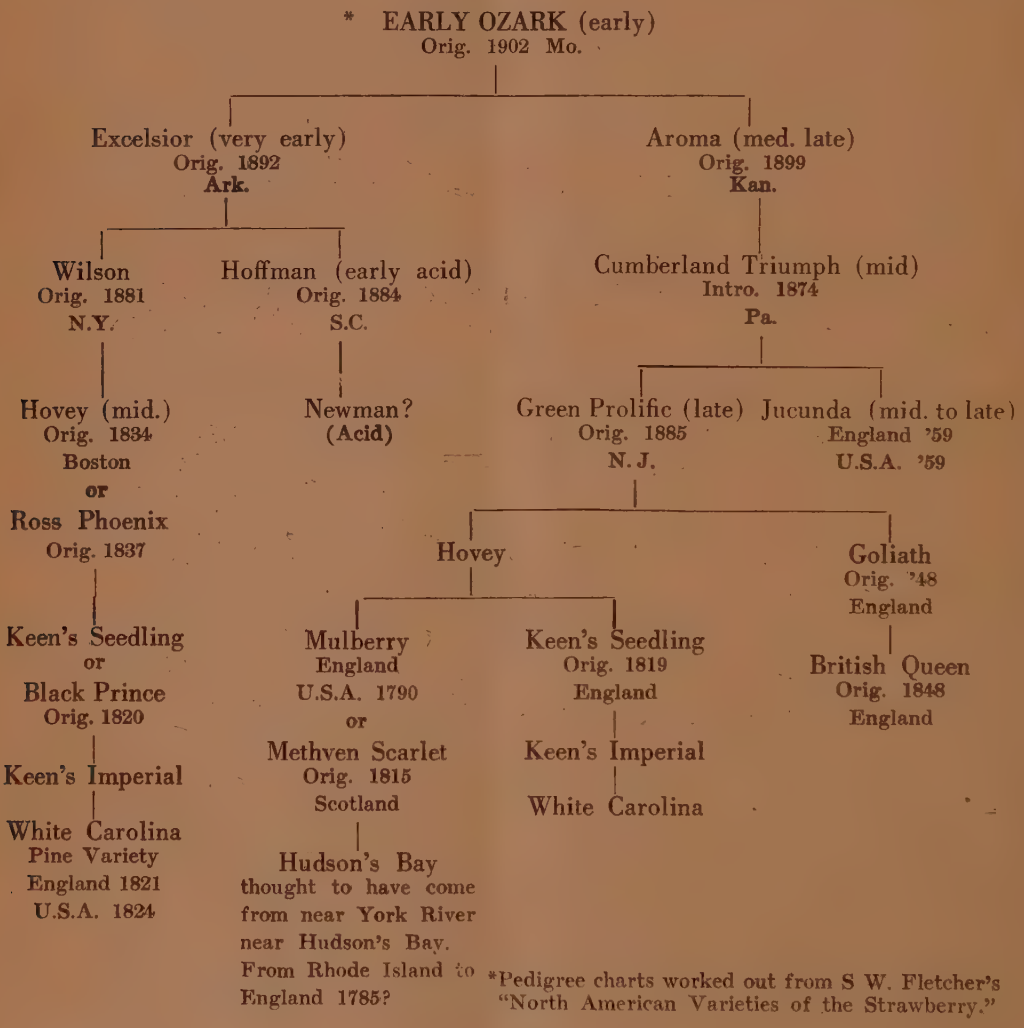
Variety	Number of times occurring as one or other parent in the seedling.	Number of good seedlings obtained	Per cent. of good seedlings
Bubach	772	0	.000
Pocomoke	958	1	.104
St. Louis Prize	523	1	.191
Senator Dunlap	1655	3	.181
Williams	4696	5	.106
Brandywine	3460	0	.000
Sample	778	1	.128
Early Ozark	2034	10	.491
Michels Early	1598	1	.062
Parsons	471	0	.000
Joe	535	1	.186
Nettie	219	1	.451

From this it will be seen that Early Ozark stands out as a good parent. It has given promising seedlings when crossed with 5 other varieties, namely, Pocomoke, Senator Dunlap, Williams, Sample and Michels Early. It gave nothing worth while when crossed with Bubach, Brandywine, Parsons Beauty and St. Louis Prize.

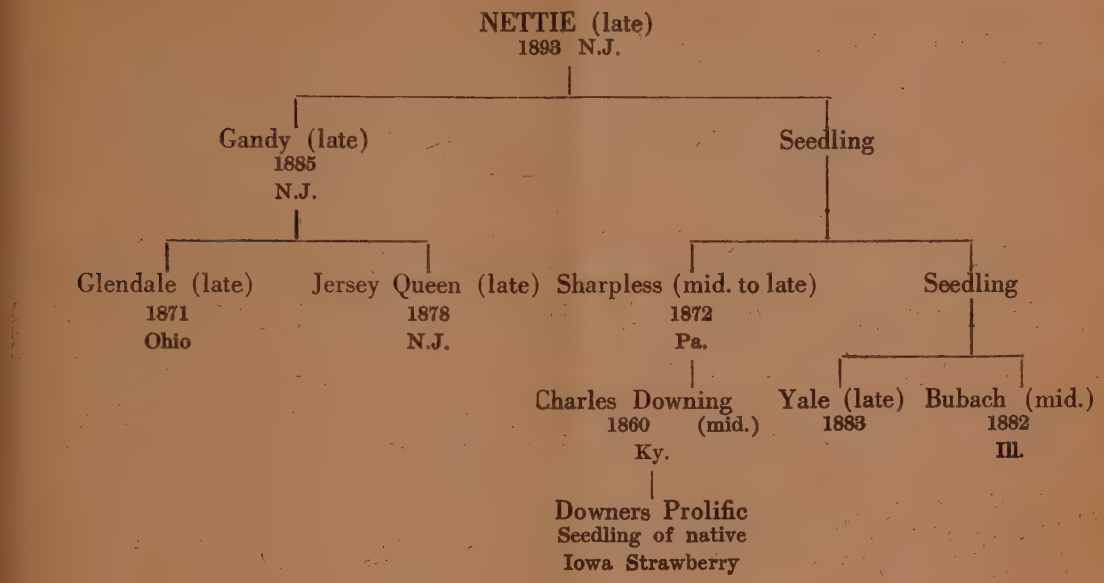
Nettie looks like a promising parent variety but it has not been tested sufficiently to allow of any definite conclusion. St. Louis Prize, Joe, Senator Dunlap and Sample look

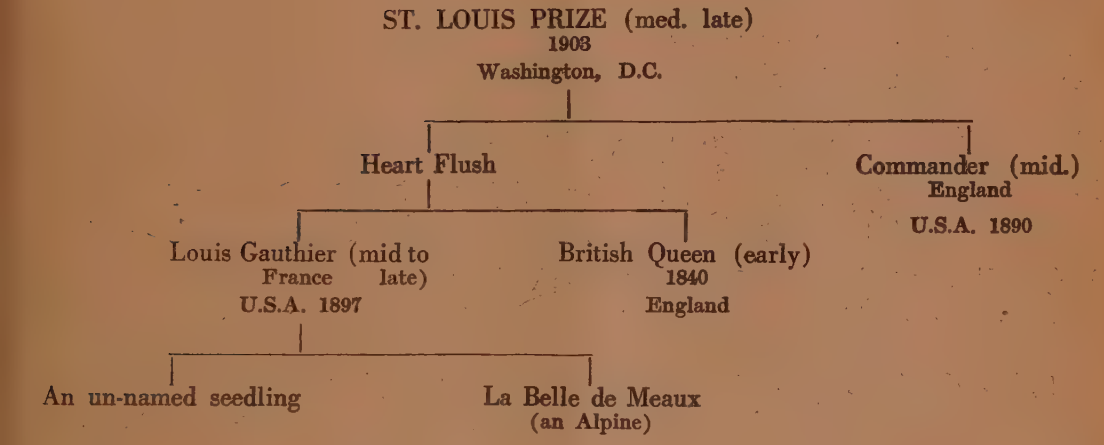
to be promising varieties, although none of these except Senator Dunlap has been tested sufficiently. Senator Dunlap shows up fairly well when used with Early Ozark but not with anything else so far tested so that whatever merit the seedlings of this cross may have may come principally from the Early Ozark parent. Williams with Ozark has given 4 promising seedlings, with Nettie has given one but nothing else worth while, when crossed with other varieties. It would seem therefore that Williams is only fair as a parent variety, also Pocomoke, while Michels Early is doubtful and Bubach, Brandywine and Parsons appear to be useless.

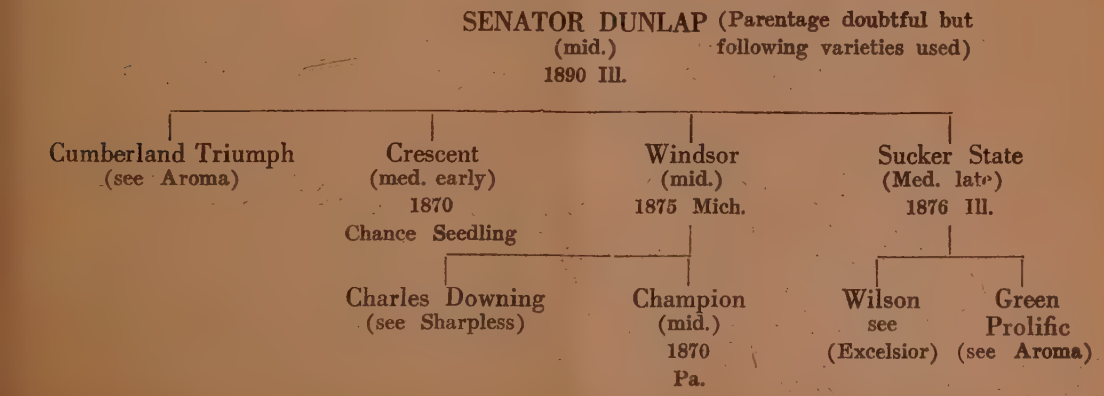
The ancestry of some of these varieties is interesting and may possibly help to explain why some are better as parents than others.

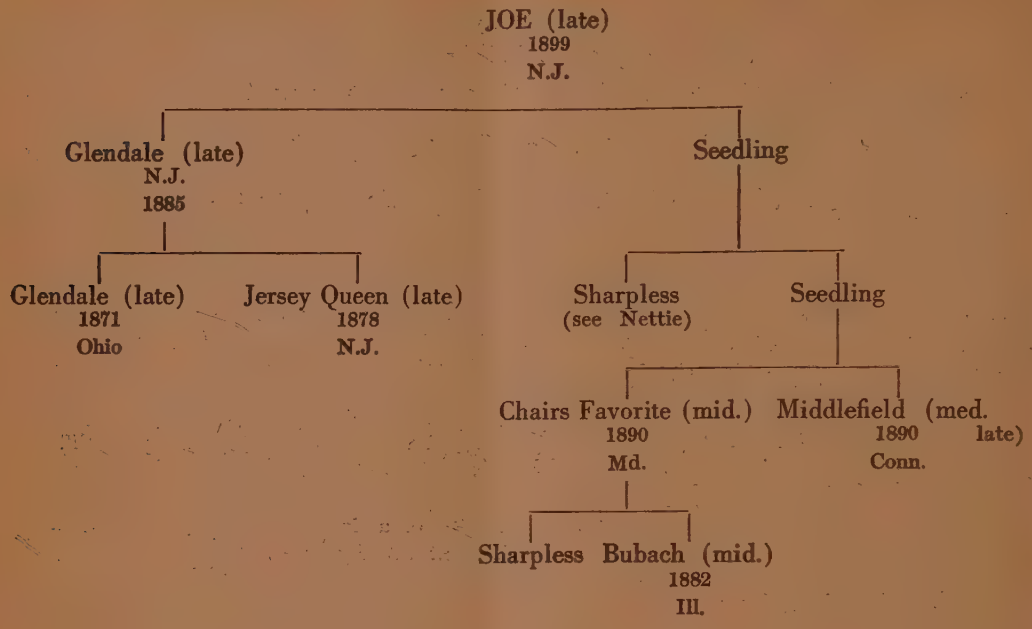


*Pedigree charts worked out from S W. Fletcher's "North American Varieties of the Strawberry."


NETTIE (late)
1893 N.J.
Gandy (late)
1885
N.J.
Seedling
Glendale (late)
1871
Ohio
Jersey Queen (late)
1878
N.J.
Sharpless (mid. to late)
1872
Pa.
Seedling
Charles Downing
1860 (mid.)
Ky.
Yale (late)
1883
Bubach (mid.)
1882
Ill.
Downers Prolific
Seedling of native
Iowa Strawberry


ST. LOUIS PRIZE (med. late)
1903
Washington, D.C.
Heart
Flush
Commander (mid.)
England
U.S.A. 1890
Louis Gauthier (mid to late)
France
U.S.A. 1897
British Queen (early)
1840
England
An un-named seedling
La Belle de Meaux
(an Alpine)


SENATOR DUNLAP (mid.)
1890 Ill.
(Parentage doubtful but following varieties used)
Cumberland Triumph
(see Aroma)
Crescent
(med. early)
1870
Chance Seedling
Windsor
(mid.)
1875 Mich.
Sucker State
(Med. late)
1876 Ill.
Charles Downing
(see Sharpless)
Champion
(mid.)
1870
Pa.
Wilson
see
(Excelsior)
Green Prolific
(see Aroma)



Sample (med. late) 1894 - Mass.

—Leader (early) 1892-Mass.

Williams (mid.) 1890 - Ontario.

—Crescent (med. early) 1870 Conn. (a chance seedling)

—Sharpless see Nettie.

Pocomoke (med. early) - 1902 - Md. (chance seedling)

Michels Early (very early) - 1886 - Ark. (probably seedling of Crescent).

Bubach (mid.) - 1882 - Ill. (seedling)

Brandywine (med. late) - 1889 - Pa.

—Glendale (see Gandy)

—Cumberland Triumph (see Aroma).

Parsons (mid.) - 1890 - Md. (chance seedling).

Methods of Making Variety Tests of Rye.*

MANLEY CHAMPLIN

Senior Professor of Agronomy, University of Saskatchewan, Saskatoon, Sask.

Agronomists are often confronted with the question, "which is the best variety of rye for this district?" It is a question of genuine importance to all farmers who grow rye. This was well illustrated in 1921 and 1922 when certain well meaning folks introduced Rosen rye into Alberta from Michigan. Good results having been obtained in 1921 on their own farms they felt justified in selling their crop seed, not only in Alberta but in Saskatchewan as well. The Saskatchewan Department of Agriculture checked up on all Saskatchewan farmers who tried this variety and found that total winter killing had occurred in most cases and partial winter killing in every case.

If the Stations had had sufficient reliable data to warrant them in publishing warnings it might have saved a large sum of money to the producers. It is true that some data existed at the University of Saskatchewan which was sufficient to warrant the statement that Rosen rye was quite certain to prove less hardy than Dakold, for example, and this statement was made to all who took the trouble to inquire and doubtless saved many from loss, but the point I wish to make is, that if any way can be devised by which variety tests of rye can be made to approach the accuracy of wheat variety tests these methods should be put into use on all stations in districts where rye is now or may become later, an important crop.

The fact that rye is open fertilized and crosses very easily in the field makes this problem difficult to an agronomist working alone. It would be necessary for him to grow an isolated seed plot of each variety that he is testing as well as to grow his test plots in series. The practical difficulties of doing this will be recognized at once by all present who are experienced in directing field experimental work. In fact, the difficulties have been so great that many of the stations have almost given up the idea of making variety tests of rye.

Mr. P. Russell Cowan, Cerealist at Ottawa, advises me that this is true of the Dominion stations. At the Central Experimental Farm an effort was made to grow the different varieties of rye in isolated plots. This method kept the seed quite pure but was not satisfactory for closely comparing varieties because of soil and topographical differences in the widely separated plots as well as the difficulties involved in securing uniform soil treatment.

At Saskatoon, we started a series of winter rye variety tests in September 1920, securing our seed from different sources that were known to be producing the varieties wanted. For example, we secured Rosen rye from Wisconsin, Swedish from Minnesota, Advance from South Dakota, Dakold from home grown stock, etc. In 1921, we planted our tests from reserves left over from the original seed. In 1922 we used the seed grown in 1921 which had only had one season in which crossing could take place. But in spite of this precaution, it was clearly apparent that a certain amount of crossing had taken place which could be observed in the crop of 1923. We continued the test planting this fall with seed grown in 1922, but it is quite apparent that our crop of 1924 will be still more mixed and the test will have to be discontinued or the seed must be renewed from distant sources.

Securing seed from distant sources is not conducive to accurate results because of the acclimatization factor. For these reasons the problem has given us considerable concern. We cannot well abandon rye variety tests in Saskatchewan as the crop is increasing in im-

*Presented to the Western Canadian Society of Agronomy, Edmonton, Alta., December, 1923.

portance. I presume the same or similar thoughts have occurred to all crop production men.

In closing then, I will suggest a line of procedure by which we may be able to solve this problem satisfactorily through co-operation of the different stations. My suggestion is that someone be appointed who shall be responsible for arranging seed sources for the several stations in the prairie provinces, that feel it their duty to conduct rye variety tests. There are more stations in these provinces than there are varieties of rye that require testing. Each station may be assigned the duty of growing an isolated seed block of one variety sufficient for all stations co-operating. These seed blocks should be large enough to provide an ample supply for all requirements for two years in order to insure against loss of continuity due to crop failure at any particular station. If possible it might be well to have two stations growing each variety the first year in order to provide against the danger of crop failure. After the first year that would be unnecessary. Each station growing seed could send sufficient seed for the variety test plots of that variety to each of the co-operating stations.

For example, Lethbridge might grow Rosen winter rye; Saskatoon, Dakold; Indian Head, Saskatchewan; Scott, Swedish; Rosthern, Advance, etc., etc. This plan would have the following advantages:

1. It would provide a continuous source of approximately pure seed for the several tests.

2. It would eliminate to a certain degree, the acclimatization factor as our stations are all under somewhat similar climatic conditions.

3. It would not over burden any one station with isolation blocks.

It is very possible that the Dominion Cerealist would be willing to undertake the office management of this project if requested to do so by this Society.

C.S.T.A. Applications for Membership

Belzile, J.D. (Laval, 1920, B.S.A.) Quebec, P.Q.

Bisson, Jos. (Montreal, 1922, B.S.A.) Montreal, P.Q.

Boucher, J. G. (Laval, 1919, B.S.A.) Edmundston, N.B.

Campagna, Elzear (Laval, 1920, B.A. 1923, B.S.A.) Ste. Anne de la Pocatière, P.Q.

Duval, Luc. (Laval, 1923, B.S.A.) Macdonald College, P.Q.

Fortin, L. de G. (Laval, 1920, B.S.A.) Ste. Anne de la Pocatière, P.Q.

Gosselin, Laurent, (Laval, 1915, B.S.A.) Valleyfield, P.Q.

Grant, W. H. (Toronto, 1921, B.S.A.) Salmon Arm, B.C.

Hanlan, L. H. (Toronto, 1922, B.S.A.) Kapuskasing, Ont.

Hunter, W. T. (Toronto, 1914, B.S.A.) Summerland, B.C.

Marcoux, J. A. (Laval, 1921, B.S.A.) Lennoxville, P.Q.

Maw, A. G. (McGill, 1923, B.S.A.) Saskatoon, Sask.

Miller, H. G., Provincial Apiarist, Fredericton, N.B. (Associate).

Proulx, R. (Laval, 1923, B.S.A.) St. Ours, P. Q.

Robitaille, F. X. (Laval, 1916, B.S.A.) Cap Rouge, P.Q.

Sirois, J.A. (Laval, 1915, B.S.A.) Ste. Anne de la Pocatière, P.Q.

Stratton, A. K. (Manitoba, 1919, B.S.A.) Teulon, Man.

Wheeler, R. L., Fruit Branch, Ottawa, Ont. (Associate).

Dans l'Abitibi avec les juges du Mérite Agricole.*

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Origine de son limon

La région de l'Abitibi est séparée des plaines argileuses du nord-est du lac Témiscamingue par la hauteur des terres, c'est-à-dire par la crête de partage entre les eaux qui ont leur écoulement vers le bassin hydrographique du fleuve St.-Laurent d'une part, et celles qui suivent la pente inverse pour aboutir dans la vaste mer que représente la Baie d'Hudson d'autre part. Il est donc clair que les limons de l'Abitibi ont dû se déposer dans un bassin distinct de celui formé par le débordement de la fosse du lac Témiscamingue.

Suivant les géologues qui ont étudié la région, ils prirent naissance dans une immense nappe d'eau douce retenue entre la hauteur des terres et le front du grand glacier continental reculant graduellement vers le nord, battu en brèche par le retour offensif d'un climat plus chaud qui allait bientôt lui arracher tout son empire sur les futurs territoires de Québec et d'Ontario. Ce lac, que probablement nul être humain ne contempla, a, néanmoins, été baptisé du nom de lac Ojibway par ses perspicaces découvreurs. Il occupa en dehors du territoire de Québec une étendue plus considérable encore dans le nord de l'Ontario, et dut évoluer et gagner en extension à mesure que le vaste barrage formé par le glacier en recul se déplaçait vers le nord. Mais, arriva le temps de la décrépitude complète des centres de glaciation du Labrador et du Keewatin; semblables à tous les conquérants que dévore l'ambition, ils durent abandonner en fin de compte la totalité du territoirs envahi, pour se contenter finalement de la possession de la calotte polaire et du Groënland, où les glaces, dites éternelles, règnent toujours en maître.

Le front glaciaire s'évanouissant, le bassin de l'Ojibway dut naturellement se vider dans la Baie d'Hudson, laissant à découvert les vastes plaines du nord connues sous le nom de Clay-Belt ou zône d'argile, dont la superficie est évaluée à 68,000 milles carrés.

Au cours de son existence éphémère, la grande mare dut être alimentée par une multitude de torrents et de rivières gonflés par la fonte continuelle des glaces et des neiges. Sur leur parcours, ces cours d'eau affouillèrent les moraines et les amas de "drift", abandonnés partout par les glaciers défunts, emportant dans leur courant les matériaux fins ou de moyenne grosseur qui allèrent se déposer sur le fond du lac Ojibway.

Ainsi, par un procédé de sédimentation continu, prit naissance la vaste manteau d'argile, d'une épaisseur moyenne de 25 pieds, recouvrant presque uniformément la plaine de l'Abitibi percée seulement, de-ci, de-là, par quelques aspérités rocheuses indiquant l'emplacement d'autant d'îlots ou de récifs qui devaient rompre la monotonie de l'immense Ojibway.

Remarquons toutefois que par endroits il n'y a pas de solution de continuité entre les dépôts d'argile sédimentaire du bassin du Témiscamingue et ceux de l'Abitibi qui se rejoignent par-dessus la ligne de faîte St-Laurent—Baie d'Hudson, devenue insensible. Il est donc probable, comme le dit M. E. Wilson dans le mémoire 103 de la Commission Géologique d'Ottawa, que l'expansion du lac Témiscamingue à laquelle on a donné le nom de lac Barlow a empiété sur le lac Ojibway, par-dessus la ligne de faîte actuelle, lorsque son niveau était au maximum.

Du Témiscamingue à l'Abitibi

Quoiqu'il en soit, il n'y a pas encore de communication directe par chemin de fer ou par route entre les cantons colonisés autour du Témiscamingue et ceux échelonnés sur le parcours du Transcontinental National dans la région de l'Abitibi. Pour y accéder sans sortir de la province de Québec il n'y a qu'un moyen: c'est de remonter en canot par les rivières et les réseaux de lacs du cours supérieur de l'Ottawa, franchir par un portage la hauteur des terres et redescendre ensuite un des cours d'eau du bassin hydrographique de la baie James. Entre les deux, il y a encore de belles plaines d'argile qui feront appel aux colons aussitôt que les communications seront plus aisées, sans oublier les fameux

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cantons miniers tels que Roun, Joanne, Boischatel, etc., où les découvertes récentes promettent le développement d'exploitations aurifères pouvant rivaliser avec celles de l'Ontario dont elles ne seront d'ailleurs que l'extension. Il va sans dire que l'exploitation aurifère entraînera un développement parallèle de l'agriculture dans ces régions encore vierges. Actuellement c'est de Ville Marie surtout que partent les prospecteurs qui vont tenter fortune et piqueter les claims, dans le nouveau Klondyke du haut Ottawa, qu'ils n'atteignent qu'après un parcours en canot et des portages sur une distance de 75 à 100 milles.

Aussi, le Service des Mines de Québec y a établi un bureau où, avec la plus grande obligeance, on fournit des cartes géologiques et des renseignements divers aux intéressés. Mais, quel que soit l'avenir, nous, agriculteurs, sommes persuadés qu'il n'y a pas de champ minier aussi sûr que le riche limon de ces régions.

N'ayant pas les loisirs de faire une longue randonnée en canot, coupée de plusieurs portages, force nous fut d'aller retrouver la ligne du "Témiscaming and Northern Ontario" qui rejoint à Cochrane le "Transcontinental National" et de pénétrer dans l'Abitibi québecquois par le nord de l'Ontario. En automobile, par un radieux dimanche, nous contournâmes la partie nord du lac Témiscamingue, traversant les belles terres du canton de Guigues et Nedelec pour reprendre le train à New Liskeard. Au cours du trajet de 150 milles séparant cette station de Cochrane nous rentrons dans la région rocheuse et impropre à la culture, caractéristique ordinaire du Plateau Laurentien, qui marque la séparation entre la nappe d'argile du bassin de l'Ottawa et celle de la baie James en cet endroit

Nous avions passé par le pays de l'argent dans la première partie de notre voyage, avant d'arriver à Cobalt, maintenant nous traversons le pays de l'or.

En effet, près de la station de Swastika, un grand écriteau, portant l'inscription "Gold Area" nous apprend que les roches arides, que l'on remarque depuis quelque temps, renferment dans leur entrailles le précieux métal dont l'extraction méthodique fournit la substance à des milliers d'ouvriers dans les centres voisins de Porcupine, Timmins, etc.

Le soir nous amène dans l'immense plaine d'où la petite ville de Cochrane émerge de la glaise comme une thalle de champignons repoussant avec obstination à chaque fois qu'on la coupe rez pied. En effet à deux reprises, en 1911 et 1916, l'incendie l'a rasée, mais sous le stimulant de sa situation géographique, jonction et siège d'une division de chemin de fer, ses maisons, son église, ses édifices publics n'ont pas tardé à se relever avec une nouvelle vigueur. Nombreux sont cependant encore les sous sols non rebâtis qui témoignent de l'étendue des désastres successifs. La moitié des habitants pour le moins sont Canadiens-français; beaucoup de ceux-ci également sont établis sur les terres des environs, impressionnante démonstration de la pénétration de l'élément québecquois dans le nord de l'Ontario.

Le lac Abitibi

Pendant que notre convoi du T. N. O. oblique à l'ouest, pour gagner Winnipeg à travers la plaine du nord, nous prenons le train du Canadien National, en sens inverse, pour pénétrer dans la portion québecquoise de la zône d'argile à la Station de "La Reine". Avant d'y arriver, nous avons de notre wagon quelques échappées sur le lac Abitibi situé à cheval sur la frontière interprovinciale. Disons tout de suite que cette grande flaque d'eau de 335 milles carrés de superficie présente des caractères absolument différents de ceux du Témiscamingue. Nous avons dit de ce dernier qu'il était long, étroit, entouré de falaises à pic, d'une profondeur effarente; le lac Abitibi, au contraire, est ramassé, a des rives plates et une profondeur moyenne ne dépassant pas 10 pieds, sur toute son étendue. Cette différence tient évidemment à l'origine tout autre du dernier qui n'est qu'un reliquat, un vestige du grand disparu, le lac Ojibway. Après égouttement de celui-ci dans la baie James il ne resta plus que quelques mares d'eau dans les bas fonds de la plaine de limon mise à jour. Le lac Abitibi représente tout simplement une des plus typiques de ces mares superficielles de la zône d'argile, alimentée par quelques cours d'eau coulant paresseusement entre leurs berges vaseuses, telles les rivières La Reine, La Sarre et la rivière du même nom. Il offre un réseau commode pour la navigation intérieure, par barges et chaloupes à essence. Aussi, les colons en font un large usage pour le trans-

port du bois ou pour se rendre sur des terres exploitées à distances plus ou moins grandes de leur résidence.

La terre de l'Abitibi

La Reine est le premier des villages québecquois échelonnés sur la ligne du Transcontinental dans son parcours de la zône argileuse qui se termine au canton de Senneterre, à 120 milles à l'est pour faire place de nouveau au chaos de roches granitiques, empire des forêts et des lacs qui se continue alors sans interruption jusque dans la plaine du St-Laurent.

Oh! les jolis noms dont on a décoré la majorité des cantons arpentés de l'Abitibi: "La Reine", "La Sarre", "Royal Roussillon", "Privat", "Trécesson", "Landrienne", "Barraute", "Senneterre", sur le parcours du Transcontinental : "Guyenne", "Berry", "Béarn", "Languedoc", "La Morandière", "Rochebeaucourt", au nord du chemin de fer, cela sonne clair et haut comme une fanfare des anciens régiments de Montcalm.

C'est à la Reine que nous faisons connaissance avec le premier des huit concurrents du Mérite Agricole dans le district de l'Abitibi. Je laisse au secrétaire de la Commission le soin d'exposer dans son rapport le mérite de ces vaillants conquérants du sol qui, en quelques années, ont établi dans une région vierge des exploitations agricoles pouvant rivaliser avec les meilleures exploitations de nos vieux comtés. Je dirai seulement que, pour la qualité du sol, "La Reine" nous a paru bien porter son nom et être le joyau de l'Abitibi. Dans cette belle argile noire toute gorgée d'humus, nous vimes de l'avoine atteignant presque hauteur d'homme, et, pour prouver tout de suite qu'elle ne pousse pas en orgueil, ajoutons que sur cette même ferme elle avait donné au battage une moyenne de 77 minots à l'arpent, l'an dernier. Chose curieuse, sur les surfaces en voie de défrichement, on constate que les arbres de la forêt primitive n'ont guère pénétré avant dans le profond limon qu'ils avaient sous leurs pieds. Les souches des épinettes sont comme collées sur le sol par leurs longues racines traçantes et s'enlèvent par grandes plaques. Ceci rend les travaux de défrichement aisés comparativement à ceux de nos régions. D'aucuns prétendent que sous la protection de l'écran de la forêt, la terre profondément gelée durant la longue période hivernale ne dégelerait pas entièrement au cours de l'été d'où la limite étroite laissée à la pénétration des racines.

Un livre pour le géologue

Celui qui observe une coupe verticale dans le limon de l'Abitibi, par example à la faveur des tranchées faites pour l'établissement de la voie du Chemin de fer National, remarque tout de suite que l'épais revêtement d'argile sédimentaire est constitué d'un grand nombre de couches alternatives, variant en épaisseur d'un quart à trois quarts de pouce. Elles se différencient facilement par leur teinte alternativement grise et blanche; ceci provient de ce que les couches blanches sont constituées d'argile sableuse, séchant relativement vite à l'air pour prendre une teinte pâle, tandis que les couches grises, constituées d'une argile de texture très fine, prennent plus de temps à évaporer leur humidité qui conserve la teinte foncée. Ainsi que décrite, la surface d'une coupe dans la glaise de l'Abitibi apparaît donc comme la tranche d'un énorme livre dont les épais feuillets seraient par alternance gris et blancs.

Sur ce grand livre de la nature, le géologue prétend lire la genèse et l'histoire de la sédimentation des richesses de l'Abitibi. Deux feuillets alternatifs représenteraient le fruit de la sédimentation d'une année sur le fond de l'Ojibway, les couches d'argile sableuse correspondant aux dépôts formés durant l'été, alors que de l'immense nappe d'eau, plus ou moins ridée sous le souffle de la brise, n'abandonnait que les particules terreuses moins fines quelle tenait en suspension, tandis que les feuillets d'argile grise, onctueuse, constituée des éléments les plus ténus, figureraient le produit de la sédimentation hivernale, opérée dans des eaux quasiment réduites à l'immobilité complète sous une épaisse couche de glace. Ayant compté sur une même coupe jusqu'à 250 feuillets de chaque espèce, des géologues tels que M. E. Wilson, déjà cité, en concluent que 250 années environ se seraient écoulées entre la naissance du lac Ojibway et sa belle mort causée par le retrait du glacier labradoréen au-delà des limites de la Baie d'Hudson.

Une erreur à éviter

C'est à La Reine et à La Sarre que nous vîmes les plus belles terres de l'Abitibi, avons-nous dit plus haut. En effet, en d'autres endroits, du côté d'Amos, notamment, on

s'aperçoit que la grasse argile noire ou couleur café, si riche en humus, fait souvent place à la glaise blanche, de qualité beaucoup inférieure évidemment, telle qu'on en rencontre dans la plupart des vieilles régions à terre forte, épuisées par une culture prolongée sans restitution.

Cette condition défavorable semble être due à la tendance de trop brûler les terres en voie de défrichement. Les colons devraient toujours avoir en vue que la conservation de l'humus des sols vierges maintient non seulement les terres en meilleure condition physique, mais qu'elle entretient aussi un véritable réservoir de matières azotées, principe essentiel des plantureuses récoltes qu'elles sont appelées à lui fournir par une décomposition graduelle, échelonnée sur un grand nombre d'années. Il faudrait donc avoir soin de ne brûler qu'un minimum de la matière organique, même sur les nombreuses étendues couvertes de mousse que l'on rencontre dans l'Abitibi, il y aura lieu de se garder de faire consumer la tourbe à fond par un temps trop sec. Mieux vaut mettre le feu lorsque la partie inférieure est encore humide, de manière à conserver une bonne couche de matière organique que l'on puisse mélanger avec l'argile sous-jacente, par le labour. Il est beaucoup plus facile, en effet, de détruire de précieuses réserves en humus que de les reconstituer.

Amos—vision d'Orient—la glaise et Einstein

En compagnie de M. Alexandre Rioux, le zélé agronome du district, devenu amoureux de la belle terre de l'Abitibi à laquelle il consacre ses soins depuis l'année 1917, nous passons par les florissantes paroisses, nées d'hier, qui se développent comme par enchantement de long du Transcontinental. Après La Reine, Dupuy, La Sarre, c'est Makamic au bord de son lac, la Ferme expérimentale du gouvernement fédéral et, enfin, Amos, jeune capitale de l'Abitibi, avec ses 2,700 habitants. Est-ce une hallucination, un mirage que cette vision de Constantinople ou de Damas, ici tout près du cercle polaire? Non, c'est l'imposante église d'Amos, construite dans le style d'une mosquée d'Orient, moins les minarets, qui surplombe de la masse de son énorme dôme la petite ville qui s'étend à ses pieds. Le temple vient d'être consacré, il y a à peu près un mois. Les somptueux édificers de plusieurs marchands généraux de la place témoignent aussi de l'activité de son commerce qui fut surtout florissant vers la fin de la guerre et les deux années qui suivirent, en bonne partie, il est vrai, grâce à l'envolée prise par l'industrie du bois à cette époque.

A Amos, nous eûmes l'avantage de rencontrer M. Authier, jadis agent des terres de l'Abitibi, et son digne collaborateur, M. Julien Beaudry. Tous ceux qui connaissent le nouvel élu de l'Abitibi, à la chambre législative, comprendront que ce fut pour nous un véritable régal d'entendre exposer les divers problèmes de la grande région de colonisation par cet homme d'étude et de travail qui en fut un des artisans de la première heure. Nul doute qu'au Parlement son influence éclairée aura les plus heureux résultats pour le développement du beau domaine de plus de 3,000,000 l'acres qui vient d'être ajouté au patrimoine agricole de la province de Québec. Quant à notre vieil ami Julien Beaudry, on ne pourrait que lui reprocher d'avoir dépensé ses forces sans compter à l'important service des chemins de colonisation qui absorbe des crédits considérables, et procure sous forme de salaires un appoint précieux aux colons qui ont à lutter avec les conditions difficiles d'un début.

Pour apprécier pleinement le côté indispensable et les bienfaits sans pareil d'un tel organisme dans la région, il suffit de s'aventurer par un jour de forte pluie, comme nous en connûmes plusieurs au cours de notre voyage, sur un chemin non amélioré par le gravelage; l'angoisse vous saisit car tout de suite on éprouve la sensation que la glaise vous suce par les pieds, prête à vous absorber tout vivant à la manière des quelque gluant poulpe marin s'attaquant à un infortuné naufragé.

Et dire après cela que nous eûmes une vive discussion avec un familier du pays, soutenant mordicus l'inexistence de la glaise dans l'Abitibi. Mais tout finit par s'expliquer grâce à la vulgarisation de la théorie d'Einstein, qui a mis le "relatif" à la mode; il s'agissait seulement de s'entendre sur le point de vue auquel nous nous plaçions. Pour notre interlocuteur, autrefois briquetier de son métier, le terme "glaise" n'avait de relation "qu'avec celui de terre à brique"; or, il paraîtrait que c'est en vain qu'on a essayé de faire de la bonne brique avec la terre de l'Abitibi.